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(54) Portable articles with flashing lights e.g. balls, toys, signs

(57) A unit or article 10 made at least partially from a light transmissive material contains light emitting means such as LED's 30, 40. In use the LED's 30, 40 flash at predetermined intervals so that when the unit or article 10 is set in motion a plurality of images is observed. A pseudo-stroboscopic effect is thus provided. The unit may be attached to any article 10, or the effect provided within any article 10, eg. a toy sword (Fig 4), a ball recreational, decorative, stage or safety articles such as a stop sign for pedestrian crossing attendants (Fig 11). The LED's 30, 40 may flash at a predetermined constant frequency and intensity, and may be of different colours and light up sequentially so that a multi-coloured plurality of images will be observed.

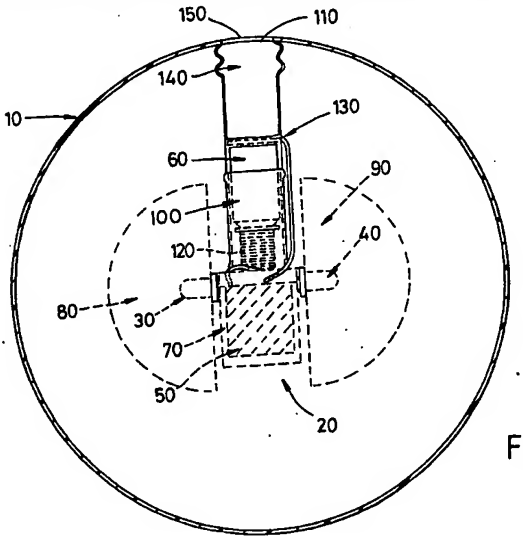

Fig. 1

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Unit and Article providing an Optical Effect

This invention relates to apparatus for producing an optical effect.

Due to the dark winter evenings in the United Kingdom, and in other countries, children are often prevented or restricted from playing.

It is therefore an object of the present invention to provide apparatus for producing an optical effect which can be used in conjunction with a toy particularly in darkened surroundings.

It is a further object of the present invention to provide apparatus for producing an optical effect which can be used in conjunction with any article wherein such an optical effect is desirable, eg. in recreational, decorative, stage or safety articles.

It is yet another object of the present invention to provide an article which produces such an optical effect.

These articles may include toys, eg. balls, swords, rockets spinning tops, skipping ropes, robots, wands, train sets or race tracks; recreational articles, eg. fairground rides, frisbees, boomerangs, swing balls, roller skates, go-karts, pedal cars, scooters, skateboards, bikes, radio controlled models, novelty torches or flashlights; decorative articles, eg. lamps or ornaments; stage articles, eg. wands, clothing, batons, drumsticks or articles for juggling; or safety articles, eg. pedestrian lollipops, life jackets or beacons. It should, however, be appreciated that this list is by no means exhaustive.

According to a first aspect of the present invention there is provided a unit for use with an article, the unit being made at least partially from a substantially light transmissive material, there being provided within the unit light emitting means, wherein, in use, the light emitting means flash at predetermined intervals, the period between consecutive flashes being less than the persistence of vision of the human eye so that when the article is set in motion a human observer will observe a plurality of images of the article.

The unit thus provides a pseudo-stroboscopic effect.

Preferably, the light emitting means flash at a predetermined constant frequency and preferably, the light emitting means comprises one or more light emitting diodes (LED's).

According to a preferred embodiment of the invention, the light emitting means comprises more than one LED which are of different colours, and which, in use, light up sequentially at separate times.

The plurality of images of the article which are observed will, therefore, be of varying colours.

Preferably, the light emitting means are controlled by an astable multivibrator circuit, which may be powered by a battery contained within the unit.

According to another aspect of the present invention there is provided an article made at least partially from a substantially light transmissive material, there being provided within the article light emitting means, wherein, in use, the light emitting means flash at predetermined intervals, the period between consecutive flashes being less than the persistence of vision of the human eye so that when the article is set in motion a human observer will observe a plurality of images of the article.

Preferably also, the article is a ball made at least partially from a resilient rubber material, such as silicone rubber.

Preferably also, the ball is spherical, and the light source is positioned substantially at or near the centre thereof.

In a preferred embodiment of the ball there are provided two LED's positioned at or near the centre of the ball, and which face in opposite directions.

The two LED's may be of the same colour, or may be of different colours, depending on the optical effect required.

Preferably also, a stopper is provided on the surface of the ball, removal of the stopper allowing access to and removal or insertion of the battery.

The stopper is preferably made from the same material as the ball.

Various embodiments of the invention will now be described by way of example only with reference to the accompanying drawings which are:

Fig. 1 A schematic sectional view of a first embodiment of a light emitting ball according to the present invention;

Fig. 2 A partial schematic sectional view of the ball of Fig. 1 showing the ball in an assembled position;

Fig. 3 A partial schematic sectional view of the ball of Fig. 1 showing the ball in a disassembled position;

Fig. 4 A circuit diagram of a first astable multivibrator suitable for use in the invention where two LED's simultaneously light;

Fig. 5 A circuit diagram of a second astable multivibrator suitable for use in the invention where two LED's consecutively light;

Fig. 6 A schematic sectional view from the top of a second embodiment of a unit according to the present invention for use in a ball;

Fig. 7 A schematic sectional view from one side of the unit of Fig. 6;

Fig. 8 A schematic sectional view from the top of the unit of Fig. 6 within a ball comprising two interlocking hemispherical portions;

Fig. 9 A schematic view from the front of a toy or stage sword according to the present invention;

Fig. 10 A schematic view from the side of a baton according to the present invention.

Fig. 11 A schematic view from the front and to one side of a pedestrian lollipop according to the present invention; and

Fig. 12 A circuit diagram of a third astable multivibrator suitable for use in the invention where two LED's of different colours are provided.

Referring to Figs. 1 to 3, there is provided a light emitting ball 10, which is spherical in shape and formed from a light transmissive, resilient rubber material such as silicone rubber. An example of a suitable material is Sylgard 186 silicone elastomer (Sylgard is a registered trademark of the Dow Corning Corporation). This is a silicone elastomer suitable for

the fabrication of silicone rubber components and also for the encapsulation of electronic components.

At or near the centre of the ball 10 is provided light emitting means 20. In this embodiment of the ball 10 the light emitting means 20 comprise two LED's 30, 40 which face in opposite directions, and which are controlled by way of a conventional astable multivibrator circuit 50, powered by a 12V battery 60.

A hard plastic case 70 is provided around the circuit 50 in order to afford protection thereto.

Also provided around each of the LED's 30 or 40 is a substantially solid plastic dome 80 or 90 made from a suitable light transmissive rubber material. Each of the domes 80 or 90 is positioned such that the base of the dome 80 or 90 faces substantially towards the centre of the ball 10, and the corresponding LED 30 or 40 is at, or near, the centre of the base of the dome 80 or 90. Each of the domes 80 or 90 may be coloured similarly to the corresponding LED 30 or 40.

The battery 60 is inserted into a cavity 100 in the ball 10 by way of an aperture 110 in the surface of the ball 10. At the base of the cavity 100 is provided a spring 120, one end of which abuts the casing 70, and the other end of which abuts the battery 60. The spring 120 is electrically connected to a first input terminal of the circuit 50, in order that the first end of the battery 60 abutting the spring 120 is electrically connected to the circuit 50. The second end of the battery 60 is connected to the circuit 50 by way of a connection terminal 130 which, when the battery 60 is placed within the cavity 100, can be placed in contact with the second end of the battery 60. Obviously, which end of the battery 60 constitutes the first end, and which end constitutes the second end, ie. positive or negative, is determined by which of the spring 120 and the terminal 130 are connected to the positive input to the circuit 50, and the ground plane of the circuit 50.

Once the battery 60 has been inserted into the cavity 100, and the terminal 130 placed in contact with the second end of the battery 60, a stopper 140 may be placed within the cavity 100, in order to close the aperture 110. The stopper 140 is preferably

made from the same material as the ball 10, and a top surface 150 of the stopper 140 shaped such that when the stopper 140 is placed within the cavity 100, the top surface 150 presents a substantially continuous spherical surface with the surface of the ball 10.

Referring now to Figs. 4 and 5. These figures show astable multivibrator circuits 50, 50f which may be used in the present invention. The output cycle of each of the circuits is determined by the selection of the values of the discrete components, ie. resistors R1 and R2, and capacitor C1, and in the case of the circuit of Fig. 5 also resistor R3. The IC depicted in Figs. 4 and 5 is the well known NE555 timer circuit. The astable multivibrator circuit 50, 50f may, however, alternatively be based on an op-amp such as the popular 741 type.

Fig. 4 shows an emample of an astable multivibrator circuit 50 wherein two LED's 30 and 40 are provided, the LED's 30, 40 being connected in such a way that in operation they will flash simultaneously. In this case both of the LED's 30, 40 will probably be of the same colour, eg. red or green.

Fig. 5 shows another example of an astable multivibrator circuit 50f, wherein two LED's 30f and 40f are provided. In this circuit 50f, however, the LED's 30f and 40f are connected in such a way that in operation they will flash consecutively. In this case the LED's 30f, 40f may therefore be of the same colour, in which case consecutive images of the projected ball 10 will be of the same colour, or of different colours, in which case consecutive images of the projected ball 10 will be of different colours.

The ball 10 may be formed by use of a mould (not shown). The mould will provide means for suspending the circuit 50, case 70, and domes 80 and 90 within the mould, such that when the silicone elastomer in liquid form is poured into the mould, the circuit 50, case 70, and domes 80 and 90 will be encapsulated in the elastomer at the desired positions within the ball 10. The elastomer can then be cured at room temperature to form a translucent, high strength elastomer. The liquid elastomer may be pigmented with a suitably coloured polyester pigment if it is desired that the ball be coloured.

In use the battery 60 is placed within the cavity 100, such that the first end of the battery 60 abuts the spring 120. The terminal 130 is then placed on the second end of the battery 60, and the aperture 110 closed using the stopper 140.

The LED's 30, 40 (30f, 40f) within the ball 10 will thus flash at a rate determined by the circuit 50 (50f), the rate being such that when the ball 10 is projected, particularly in darkened surroundings, a human observer will observe a "trail" of images of the ball 10 as it travels along the projected path.

The domes 80, 90 being suitably coloured the same or similarly to the corresponding LED's 30, 40 (30f, 40f), will aid in dispersing the light emitted by the LED's 30, 40 (30f, 40f). In this way the emitted light will appear to emanate from an illuminated dome 80 or 90 rather than from the point source LED's 30, 40 (30f, 40f).

Referring to Figs. 6 to 8, there is provided a unit 2a for use within a ball 10a. The unit 2a comprises a substantially disc shaped member 3a, providing an astable multivibrator circuit 50a powered by a rechargeable 9V battery 60a. The member 3a further provides an on-off switch 4a to control the supply of electrical power from the battery 60a to the circuit 50a, and has on either of its surfaces an LED 30a, 40a.

Provided on an edge of the member 3a is a socket 8a to which a recharging unit (not shown) can be connected to recharge the battery 60a.

The ball 10a comprises two substantially hemispherical portions 5a, 6a which can be locked together, eg. by complimentary thread portions (not shown) on each hemispherical portion 5a, 6a.

The base of each hemispherical portion 5a, 6a is so shaped such that when the two portions 5a, 6a are fitted together a cavity 7a is defined therein, the cavity 7a being suitable for the firm retention of the unit 2a within the ball 10a.

Figs. 9 to 11 show various articles embodying the present invention.

Fig. 9 shows a toy or stage sword comprising a handle 11b and blade 12b. The handle 11b may be made of plastic, and the blade 12b of a clear material such as perspex.

Contained within the handle 11b is a multivibrator circuit 50b powered by a 9V battery 60b. The circuit 50b controls an LED 30b, such that, in use, when the battery 60b supplies power to the circuit 50b the LED 30b flashes at predetermined intervals. A reflecting shield 13b is further provided to direct the light.

In this way light will travel up the length of the blade 12b such that when the sword is waved a plurality of blade 12b images will be observed.

Fig. 10 shows a toy or stage baton comprising a hollow, partially transparent rod, 21c. Within the rod 21c near one end thereof is contained a multivibrator circuit 50c powered by three batteries 60c contained within a battery case 22c within the rod 21c. Since the circuit 50c is provided near one end of the baton, a counterweight 23c may be provided at the other end thereof to balance the baton.

The ends 24c, 25c of the baton may be made of an at least partially transparent material, having a cavity 26c therein wherein an LED 30c, 40c may be located.

Fig. 11 shows a pedestrian lollipop comprising a handle member 31d and a sign member 32d at the top end thereof. A multivibrator circuit 50d is provided within the lollipop to control a plurality of LED's 30d of the same colour.

In the example shown the plurality of LED 30d are arranged to spell the word 'stop'. In use, an on-off switch 33d on the handle 31d may be switched on to supply power from a battery 60d contained within the handle 31d to the circuit 50d in order to operate the LED's 30d. The LED's 30d will then flash simultaneously at the required intervals.

In this way, in use, when the lollipop is moved a plurality of images of the word 'stop' will be observed.

Fig. 12 shows a third astable multivibrator circuit 50e suitable for use in the invention connected to a rechargeable batter 60e. The battery 60e can be recharged via socket 8e, and the circuit 50e switched on or off by use of switch 4e. The circuit 50e is connected to two tri-colour LED's 30e, 40e which can emit, eg. either green or red light. A switch 41e is provided in order that a user can choose which colour of light the LED's 30e, 40e will emit.

This circuit 50e may, therefore, be used in applications where it may be desired to change the colour of emitted light.

The invention disclosed hereinbefore provides a unit or article, particularly suitable for use in darkened surroundings, which provides an optical effect, ie. a pseudo-stroboscopic effect. It should, however, be appreciated that the embodiments of the invention described hereinbefore are given by way of example only, and are not meant to limit the scope of the invention in any way.

Claims

1. A unit for use with an article, the unit being made at least partially from a substantially light transmissive material, there being provided within the unit light emitting means, wherein, in use, the light emitting means flash at predetermined intervals, the period between consecutive flashes being less than the persistence of vision of the human eye so that when the article is set in motion a human observer will observe a plurality of images of the article.

2. A unit as claimed in claim 1, wherein the light emitting means flash at a predetermined constant frequency and intensity.

3. A unit as claimed in any of claims 1 to 2 inclusive, wherein the light emitting means comprises one or more light emitting diodes (LED's).

4. A unit as claimed in any of claims 1 to 3 inclusive, wherein the light emitting means comprises more than one LED which are of different colours, and which, in use, light up sequentially at separate times.

5. A unit as claimed in any of claims 1 to 4, wherein the light emitting means is controlled by an astable multivibrator circuit powered by a battery contained within the unit.

6. An article made at least partially from a substantially light transmissive material, there being provided within the article light emitting means, wherein, in use, the light emitting means flash at predetermined intervals, the period between consecutive flashes being less than the persistence of vision of the human eye so that when the article is set in motion a human observer will observe a plurality of images of the article.

7. An article as claimed in claim 6, wherein the light emitting means flash at a predetermined constant frequency and intensity.

8. An article as claimed in any of claims 6 to 7 inclusive, wherein the light emitting means comprises one or more light emitting diodes (LED's).

9. An article as claimed in any of claims 6 to 8 inclusive, wherein the light emitting means comprises more than one LED which are of different colours, and which, in use, light up sequentially at separate times.

10. An article as claimed in any of claims 6 to 9, wherein the light emitting means is controlled by an astable multivibrator circuit powered by a battery contained within the article.

11. An article as claimed in any of claims 6 to 10 inclusive, wherein the article is a ball made at least partially from a resilient rubber material.

12. An article as claimed in claim 11, wherein the ball is spherical, and the light source is positioned substantially at or near the centre thereof.

13. A unit substantially as hereinbefore described with reference to Figs 4 to 8 and Fig. 12.

14. An article substantially as hereinbefore described with reference to Figs. 1 to 3 and Figs. 9 to 13.

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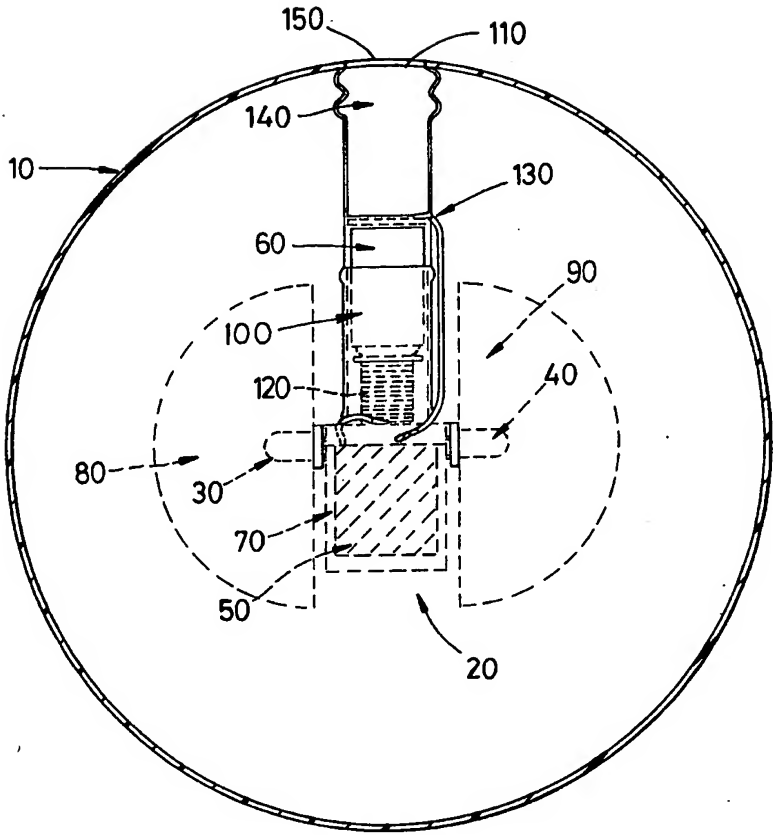


Fig. 1

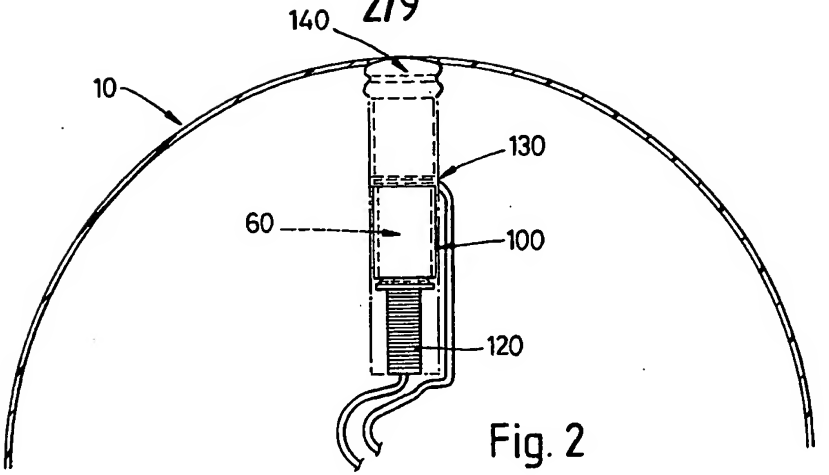


Fig. 2

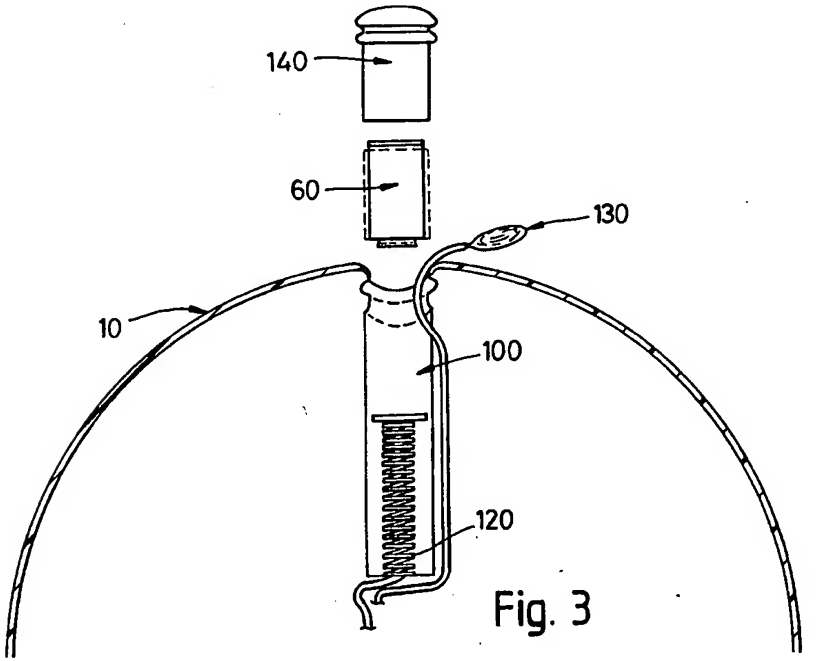
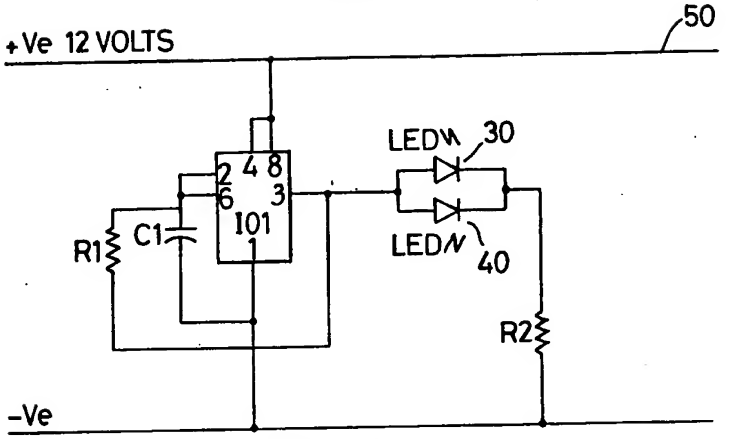


Fig. 3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40
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Fig. 4

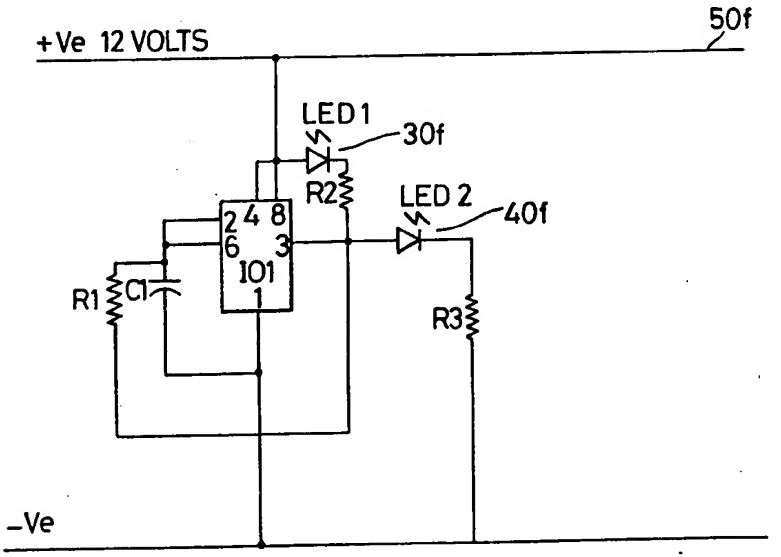
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Fig. 5

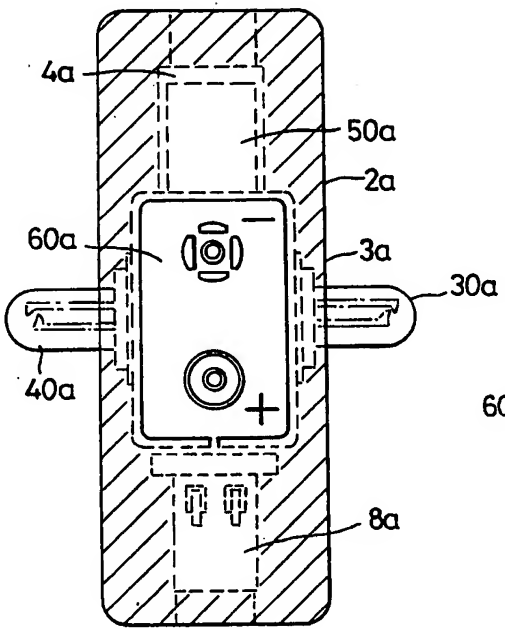

Fig. 6

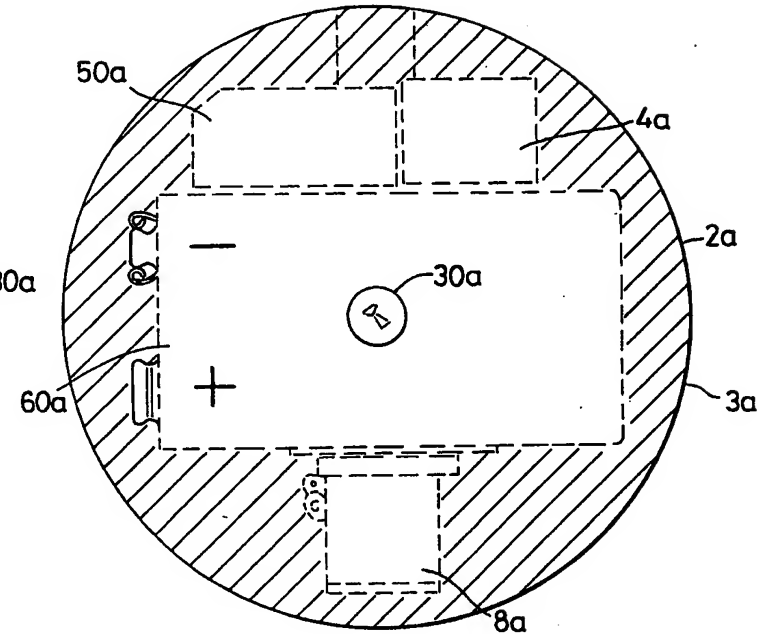

Fig. 7

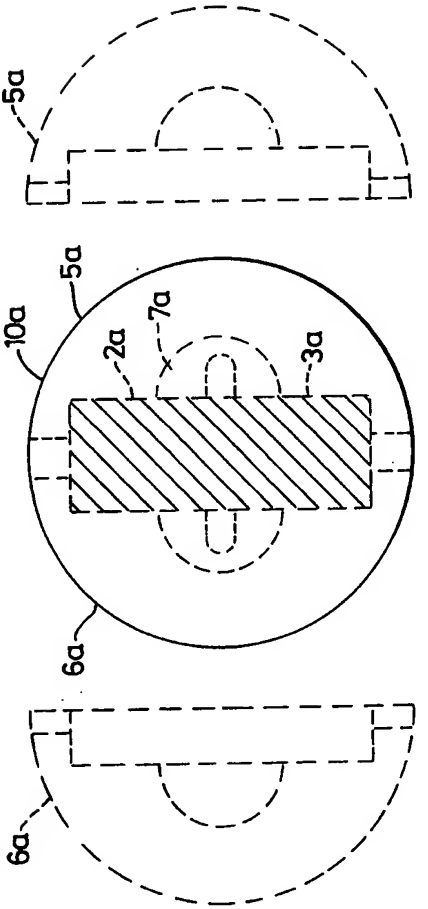

Fig. 8

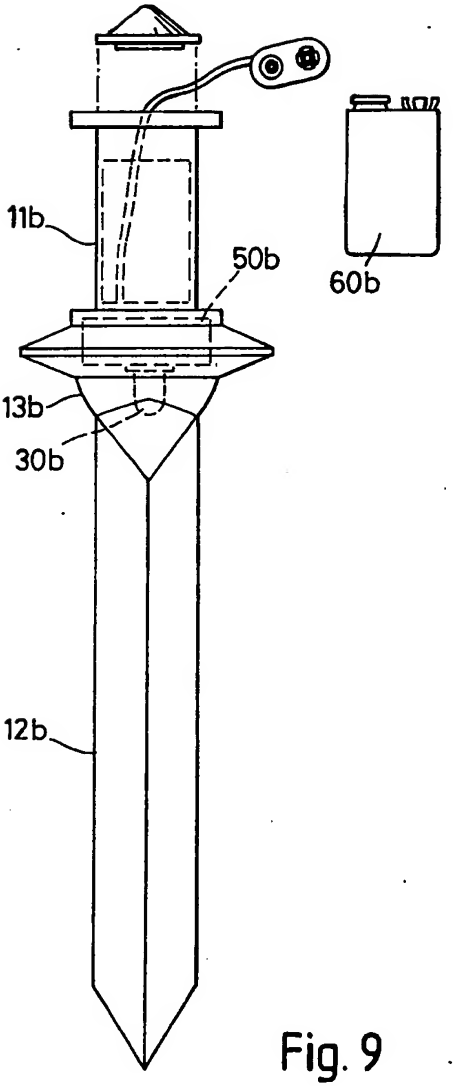

Fig. 9

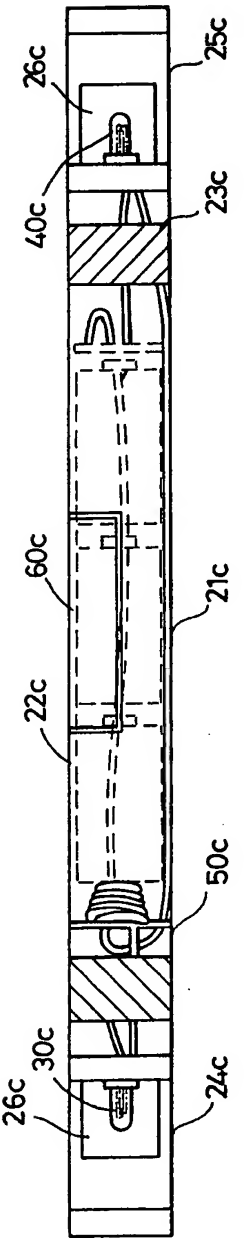

Fig. 10

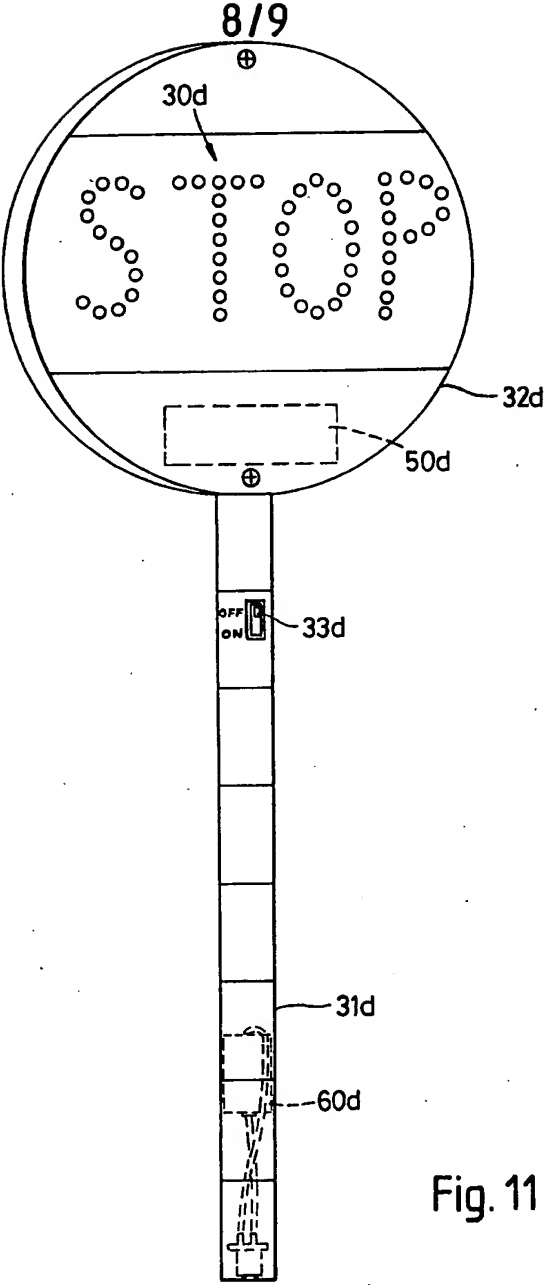

Fig. 11

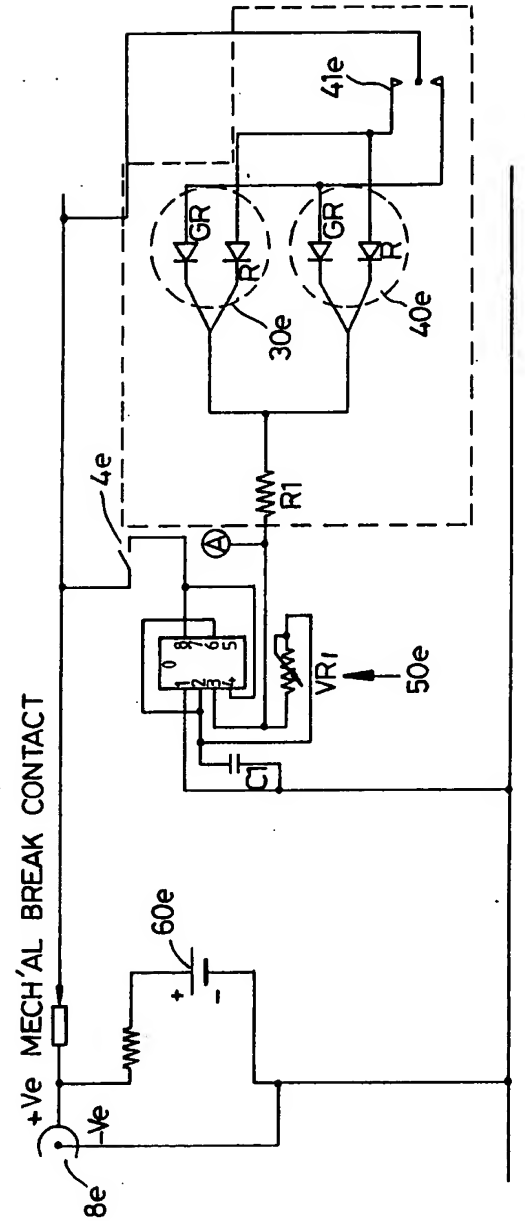
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Fig. 12